

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please amend Claims 1, 15, 29, and 30; as follows:

4 1. (Currently Amended) An automated sequential reaction system for automatically and
5 sequentially producing a substance library of different desired chemical products from a plurality of
6 reactants in accord with a programmed series of steps, comprising:

7 (a) a first automated reactant supply comprising a plurality of separate reactant
8 chambers, each adapted to be filled with a different reactant;

9 (b) a first supply valve that is automatically actuatable and is connected to the first
10 automated reactant supply to select a desired first reactant from among the plurality of separate
11 reactant chambers;

12 (c) a solvent supply, said solvent supply being configured to contain a solvent for
13 flushing said automated sequential reaction system;

14 (d) a reaction module coupled in fluid communication with said first supply valve,
15 such that a reactant chamber selected from within said automated first reactant supply by the first
16 supply valve is placed in fluid communication with said reaction module, said reaction module
17 including a general purpose chemical reactor that is operable to produce the substance library of
18 different desired chemical products from the plurality of reactants;

19 (e) an output valve that is automatically actuatable and is coupled in fluid
20 communication with the reaction module to receive a desired chemical product, said desired chemical
21 product contributing to the substance library of different desired chemical products;

22 (f) an automated product collector in fluid communication with said output valve
23 to receive the desired chemical product and comprising a plurality of product chambers, each product
24 chamber being adapted to be filled with a different desired product to produce the substance library
25 of different desired chemical products; and

26 (g) a system controller controllably connected to the first automated reactant
27 supply, the first supply valve, and the automated product collector, said system controller being
28 programmed to monitor and control production of the plurality of desired chemical products by the
29 automated sequential reaction system, the system controller being configured to ~~continuously~~ operate
30 the automated sequential reactant system ~~over a period of time~~ as required to produce the substance

1 library of different desired chemical products, during which the system controller implements
2 implementing the steps of:

3 (i) controlling the first automated reactant supply and the first supply
4 valve to introduce ~~[[a]] each~~ reactant required to produce ~~a first desired product into the general~~
5 ~~purpose reactor for a period of time sufficient to produce a desired quantity of the first desired~~
6 ~~product~~ the substance library of different desired chemical products in a desired order; and

7 (ii) controlling the solvent supply to flush the general purpose reactor with
8 the solvent ~~after the desired quantity of the first desired product has been produced; and as required,~~
9 such that while the automated sequential reaction system is operational, a fluid discharged from the
10 reaction module alternates between:

11 (A) one of the different desired chemical products; and

12 (B) the solvent and any residual chemical product that is flushed
13 from the reactor by the solvent

14 (iii) ~~repeating steps (i) and (ii) with different reactants as necessary to~~
15 ~~produce each other desired chemical product needed to complete the substance library, such that a~~
16 ~~volume of solvent separates each different desired product discharged from the general purpose~~
17 ~~reactor, thereby achieving discharge of a continuous flow of fluid from the general purpose reactor~~
18 ~~during the period of time the automated sequential reaction system is operated continuously, the~~
19 ~~continuous flow comprising different desired products separated by a volume of the solvent.~~

20 2. (Previously Presented) The automated sequential reaction system of Claim 1, wherein said
21 solvent supply is selectively placed into fluid communication with the reaction module by the first
22 supply valve under control of the system controller, to enable a solvent to flow from said solvent
23 supply into said reaction module.

24 3. (Original) The automated sequential reaction system of Claim 2, wherein said automated
25 product collector further comprises a spent solvent reservoir, said spent solvent reservoir being
26 adapted to contain a spent solvent that has been used to flush said sequential reaction system, said
27 spent solvent reservoir being selectively placed into fluid communication with the reaction module by
28 the output valve under control of said system controller, to enable a spent solvent to flow from the
29 reaction module into said spent solvent reservoir.

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1 4. (Previously Presented) The automated sequential reaction system of Claim 1, wherein the
2 solvent supply is part of the first automated reactant supply.

3 5. (Canceled)

4 6. (Previously Presented) The automated sequential reaction system of Claim 1, further
5 comprising an automated detector disposed between the output valve and the reaction module and
6 coupled to the system controller, said automated detector providing an output signal to the system
7 controller that is indicative of whether a spent solvent or a desired chemical product is flowing from
8 the reaction module, said system controller responding to the output signal to actuate the output valve
9 to:

10 (a) selectively couple the reaction module in fluid communication with the
11 automated product collector if the output signal indicates that a desired product is flowing from the
12 reaction module; and

13 (b) selectively couple the reaction module in fluid communication with the spent
14 solvent reservoir if the output signal indicates that a spent solvent is flowing from the reaction
15 module.

16 7. (Previously Presented) The automated sequential reaction system of Claim 1, further
17 comprising a heat exchanger controllably connected to said system controller, said heat exchanger
18 being configured to enable the system controller to control a temperature within said reaction module.

19 8. (Original) The automated sequential reaction system of Claim 7, wherein said heat
20 exchanger is disposed within said reaction module.

21 9. (Previously Presented) The automated sequential reaction system of Claim 1, further
22 comprising a pump having an inlet in fluid communication with said supply valve, and an outlet
23 coupled in fluid communication with an inlet to the chemical reactor, said pump being controllably
24 connected to said system controller to enable control of a flow rate of a first desired reactant into the
25 chemical reactor.

26 10. (Original) The automated sequential reaction system of Claim 1, wherein the reaction
27 module includes a residence time chamber in fluid communication with an outlet of the chemical
28 reactor, said residence time chamber providing additional time for a desired chemical product to be
29 produced and having an outlet coupled in fluid communication with the output valve.

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1 11. (Original) The automated sequential reaction system of Claim 1, wherein said chemical
2 reactor comprises a microreactor.

3 12. (Original) The automated sequential reaction system of Claim 1, wherein said system
4 controller includes a memory, a processor, and a user interface, said memory storing machine
5 instructions that define the automated sequence of steps and which are executed by the processor to
6 effect automatic control of the automated sequential reaction system.

7 13. (Previously Presented) The automated sequential reaction system of Claim 9, wherein
8 said outlet valve comprises a proportional valve configured to act as a throttle to enable a pressure along
9 a reaction path to be selectively varied.

10 14. (Original) The automated sequential reaction system of Claim 1, further comprising a
11 second supply valve, and a second automated reactant supply, said second automated reactant supply
12 comprising a plurality of separate reactant chambers, each adapted to be filled with a different
13 reactant, said second supply valve being automatically actuatable and connected to the second
14 automated reactant supply to select a second desired reactant from among the plurality of separate
15 reactant chambers included therein under control of said system controller, said first desired reactant
16 and said second desired reactant being supplied to the reaction module to produce the desired
17 product.

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1 15. (Currently Amended) An automated sequential reaction system for sequentially
2 producing a substance library of a plurality of different chemical products using selected desired
3 reactants from among a plurality of different reactants, comprising:

4 (a) a first automated fluid supply comprising a plurality of first separately
5 addressable volumes that are selectively coupled in fluid communication with a first outlet, each
6 volume being adapted to contain a different reactant;

7 (b) a second automated fluid supply comprising a plurality of second separately
8 addressable volumes that are selectively coupled in fluid communication with a second outlet, each
9 volume being adapted to contain a different reactant;

10 (c) a chemical reactor in fluid communication with said first outlet to receive a
11 first desired reactant therefrom and with said second outlet to receive a second desired reactant
12 therefrom, said chemical reactor being generally configured for sequentially producing the plurality
13 of different chemical products by reacting successive different first and second desired reactants;

14 (d) a solvent supply adapted to contain a solvent and selectively provide the
15 solvent to the chemical reactor for flushing the chemical reactor after each of the plurality of different
16 chemical products has been produced thereby;

17 (e) an automated fluid collector comprising a plurality of separate fluid volumes,
18 each fluid volume being selectively coupled to the chemical reactor to receive a different chemical
19 product therefrom;

20 (f) a spent solvent reservoir that is selectively coupled in fluid communication
21 with the chemical reactor, to receive a spent solvent that was used for flushing the chemical reactor
22 after each different desired chemical product has been produced thereby; and

23 (g) a system controller controllably connected to the first automated fluid supply,
24 the second automated fluid supply, the solvent supply, the chemical reactor, the spent solvent
25 reservoir, and the automated fluid collector, said system controller being programmed to
26 ~~continuously operate the automated sequential reactant system over a period of time, during which~~
27 ~~the system controller implements the steps of~~ operate the automated sequential reactant system as
28 required to produce the substance library of different desired chemical products, the system controller
29 implementing the steps of:
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1 (i) controlling the first automated reactant supply, the first supply valve,
2 the second automated reactant supply, and the second supply valve to introduce ~~the reactants required~~
3 ~~to produce a first chemical product into the chemical reactor~~ each reactant required to produce the
4 substance library of different desired chemical products in a desired order; and

5 (ii) controlling the solvent supply to flush the chemical reactor with the
6 solvent as required, such that while the automated sequential reaction system is operational, a fluid
7 discharged from the reaction module comprises either one of the different desired chemical products,
8 or the solvent along with any residual chemical product that is flushed from the reactor by the solvent
9 after the desired quantity of the first chemical product has been produced; and

10 (iii) ~~sequentially repeating steps (i) and (ii) using at least one different~~
11 ~~reactant in each subsequent sequence, to produce different chemical products, such that a volume of~~
12 ~~solvent separates each different chemical product discharged from the chemical reactor to produce~~
13 ~~the plurality of different chemical products, thereby achieving a continuous flow of fluid being~~
14 ~~discharged from the chemical reactor during the period of time the automated sequential reaction~~
15 ~~system is operated continuously, the continuous flow comprising different chemical products~~
16 ~~separated by a volume of the solvent.~~

17 16. (Original) The automated sequential reaction system of Claim 15, further comprising a
18 pump in fluid communication with said first outlet of said first fluid supply, with said second outlet
19 of said second fluid supply, and with said chemical reactor, said pump being controllably connected
20 to said system controller, which controls a flow rate of the first and second desired reactants through
21 said automated sequential reaction system with the pump.

22 17. (Original) The automated sequential reaction system of Claim 15, further comprising a
23 residence time chamber in fluid communication with an outlet of said chemical reactor, said
24 residence time chamber providing additional time for a chemical product to be produced and having
25 an outlet coupled in fluid communication with the automated fluid collector and the spent solvent
26 reservoir.

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1 18. (Previously Presented) The automated sequential reaction system of Claim 15, further
2 comprising a detector in fluid communication with an outlet of said reactor, said detector producing a
3 signal indicative of the type of fluid being discharged, said detector being controllably connected to
4 said system controller, said system controller directing a spent solvent to said spent solvent reservoir
5 and a desired chemical product to said automated fluid collector.

6 19. (Previously Presented) The automated sequential reaction system of Claim 15, further
7 comprising a heat exchanger controllably connected to said system controller, said heat exchanger
8 being configured to enable the system controller to control a temperature within said chemical
9 reactor.

10 Claims 20-27. (Canceled)

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1 28. (Previously Presented) An automated sequential reaction system for automatically and
2 sequentially producing a substance library of different desired chemical products from a plurality of
3 reactants in accord with a programmed series of steps, comprising:

4 (a) a first automated reactant supply comprising a plurality of separate reactant
5 chambers, each adapted to be filled with a different reactant;

6 (b) a first supply valve that is automatically actuatable and is connected to the first
7 automated reactant supply to select a first desired reactant from among the plurality of separate
8 reactant chambers;

9 (c) a reaction module coupled in fluid communication with said first supply valve,
10 such that a reactant chamber selected from within said automated reactant supply by the first supply
11 valve is placed in fluid communication with said reaction module, said reaction module including a
12 general purpose chemical reactor that is operable to produce the substance library of different desired
13 chemical products from the plurality of reactants;

14 (d) an output valve that is automatically actuatable and is coupled in fluid
15 communication with the reaction module to receive a desired chemical product, said desired chemical
16 product contributing to the substance library of different desired chemical products;

17 (e) an automated product collector in fluid communication with said output valve
18 to receive the desired chemical product and comprising a plurality of product chambers, each product
19 chamber being adapted to be filled with a different desired product to produce the substance library
20 of different desired chemical products;

21 (f) a system controller controllably connected to the first automated reactant
22 supply, the first supply valve, the reaction module, and the automated product collector, said system
23 controller being programmed to monitor and control production of the plurality of desired chemical
24 products by the automated sequential reaction system, including controlling the first supply valve to
25 select the first desired reactant, and controlling the output valve to select a product chamber into
26 which the desired product is directed; and

27 (g) an automated detector disposed between the output valve and the reaction
28 module and coupled to the system controller, said automated detector providing an output signal to
29 the system controller that is indicative of whether a spent solvent or a desired chemical product is
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1 flowing from the reaction module, said system controller responding to the output signal to actuate
2 the output valve to:

3 (i) selectively couple the reaction module in fluid communication with the
4 automated product collector if the output signal indicates that a desired product is flowing from the
5 reaction module; and

6 (ii) selectively couple the reaction module in fluid communication with a
7 spent solvent reservoir if the output signal indicates that a spent solvent is flowing from the reaction
8 module.

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1 29. (Currently Amended) An automated sequential reaction system for automatically and
2 sequentially producing a substance library of different desired chemical products from a plurality of
3 reactants in accord with a programmed series of steps, comprising:

4 (a) a reactor configured to generate a desired chemical product from at least one
5 reactant;

6 (b) a first reactant delivery structure configured to selectively deliver one of a
7 plurality of different first reactants to the reactor;

8 (c) a solvent delivery structure configured to selectively deliver a solvent to the
9 reactor, to enable the reactor to be flushed with the solvent; and

10 (d) a system controller controllably connected to said first reactant delivery
11 structure and said solvent delivery structure, the system controller being configured to ~~continuously~~
12 operate the automated sequential reactant system ~~over a period of time~~ as required to produce the
13 substance library of different desired chemical products, during which the system controller
14 ~~implements~~ implementing the steps of:

15 (i) controlling the first reactant delivery structure to introduce a reactant
16 required to produce a first desired product into the reactor for a period of time sufficient to produce a
17 desired quantity of the first desired product;

18 (ii) controlling the solvent delivery structure to flush the reactor with the
19 solvent after the desired quantity of the first desired product has been produced; and

20 (iii) repeating steps (i) and (ii) for each additional reactant required to
21 produce an additional desired product, such that a volume of solvent separates each different desired
22 product discharged from the reactor to produce the substance library of different desired chemical
23 products, ~~thereby discharging a continuous flow of fluid from the reactor during the period of time~~
24 ~~the automated sequential reaction system is operated continuously, the continuous flow of fluid~~
25 ~~comprising~~ such that a flow of fluid discharged from the reactor comprises different desired chemical
26 products separated by the solvent.

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1 30. (Currently Amended) An automated sequential reaction system for automatically and
2 sequentially producing a substance library of different desired chemical products from a plurality of
3 reactants in accord with a programmed series of steps, comprising:

4 (a) a reactor configured to generate a desired chemical product from at least one
5 reactant;

6 (b) ~~a heat exchanger configured to control temperature conditions within the~~
7 ~~reactor;~~

8 ~~(c)~~ a first reactant delivery structure configured to selectively deliver one of a
9 plurality of different first reactants to the reactor;

10 ~~(d)~~ a solvent delivery structure configured to selectively deliver a solvent to the
11 reactor, to enable the reactor to be flushed with the solvent; ~~and~~

12 (d) an output valve that is automatically actuatable and is coupled in fluid
13 communication with the reactor to receive a fluid being discharged from the reactor;

14 (e) an automated detector disposed between the output valve and the reactor, said
15 automated detector providing an output signal that is indicative of whether the fluid being discharged
16 from the reactor comprises the solvent; and

17 ~~(ef)~~ a system controller controllably connected to said first reactant delivery
18 structure, said solvent delivery structure, said output valve, and said ~~heat exchanger~~ automated
19 detector, the system controller being configured to ~~continuously~~ operate the automated sequential
20 reactant system ~~over a period of time~~ as required to produce the substance library of different desired
21 chemical products, during which the system controller sequentially implements the following steps in
22 order to produce the substance library of different desired chemical products implementing the steps
23 of:

24 (i) controlling the first reactant delivery structure to introduce ~~a reactant~~
25 ~~required to produce a desired product into the reactor for a period of time sufficient to produce a~~
26 ~~desired quantity of the desired product~~ into the reactor each reactant required to produce the
27 substance library of different desired chemical products in a desired order;

28 ~~(ii) controlling the heat exchanger to control temperature conditions within~~
29 ~~the reactor to facilitate production of the desired product~~ controlling the solvent delivery structure to
30 flush the reactor with the solvent as required; and

1 (iii) controlling the solvent delivery structure to flush the reactor with the
2 solvent after the desired quantity of the desired product has been produced state of the output valve
3 based on the signal provided by the automated detector, such that when the signal from the automated
4 detector indicates that a solvent is being discharged from the reactor module, the output valve is
5 placed in fluid communication with the spent solvent collection volume, and when the signal from
6 the automated detector indicates that a solvent is not being discharged from the reactor, the output
7 valve is placed in fluid communication with the automated product collector.
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